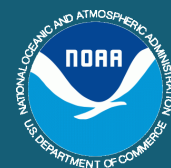


Global Systems Laboratory



Impacts

Easton	12:09P	9	ON TIME
Houston (Hobby)	12:10P	16	ON TIME
Austin	12:10P	16	ON TIME
Atlanta	12:35P	20	ON TIME
Atlanta	1:00P	22	DELAYED
Las Vegas	1:00P	1	ON TIME
Denver	1:00P	14	ON TIME
San Diego	1:00P	14	ON TIME
Dallas (Love)	1:05P	16	ON TIME
	1:05P	16	ON TIME
Houston	1:29P	3	ON TIME
Denver	1:35P	5	ON TIME
Los Angeles	1:40P	6	ON TIME
St. Louis	1:55P	14	ON TIME
	1:55P	24	ON TIME

Economy

GSL research supports the U.S. economy with increasingly accurate weather data and forecasts.

Public: The American public collectively receives \$31.5B in benefits from forecasts each year.

- “GSL’s development of foundational and pragmatic state-of-the-science technologies to improve predictions of weather and its impacts on society has been one of the nation’s true success stories that is significantly under-appreciated given the enormous value it returns to the nation.” - The Weather Company

Aviation: 69% of aviation flight delays are caused by weather, costing air travelers billions of dollars each year.

- “The most recent transition of the High-Resolution Rapid Refresh (HRRR) model to NWS operations improves aviation forecasts at air terminals and aloft, reducing air traffic delays which cost the airline industry billions of dollars annually.” - FAA

Energy: Cost estimates from storm-related power outages to the U.S. economy are between \$20B and \$55B annually.

- “NOAA’s continual advancement of forecast skill improves the stability of our electric grid.” - Vaisala Corporation

Industry

GSL research improves weather data, forecasts, and computing techniques used by industry.

Computing: GSL develops high-performance computing methods to increase compute power at minimum cost.

- GSL’s supercomputer provides 51% of NOAA’s weather research and development computing.

Agriculture: Both short- and long-term forecasts are essential in agriculture production.

- HRRR predictions support better localized precipitation forecasts.

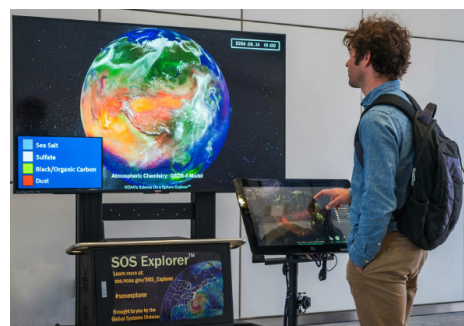
Aviation: The FAA requires airlines to carry enough fuel for an aircraft to fly to an alternate destination if weather conditions fall below certain thresholds.

- The HRRR model is the largest contributor to the FAA’s NextGen Weather system that supports strategic traffic flow management.

- GSL-developed data delivery and decision support systems are the cornerstone of operations in all 122 NWS forecast offices.
- The GSL-developed HRRR forecast model is the only hourly-updated forecast in the world that is proven to predict weather hazards for individual neighborhoods.

Many household decisions depend on weather forecasts and weather data.

- GSL developed the weather data collection system that benefits all users of smart-phone weather apps.



Public Safety

GSL-developed technology supports the NOAA National Weather Service (NWS) and public situational awareness.

94% of impact-based weather decision support is delivered by the NWS.

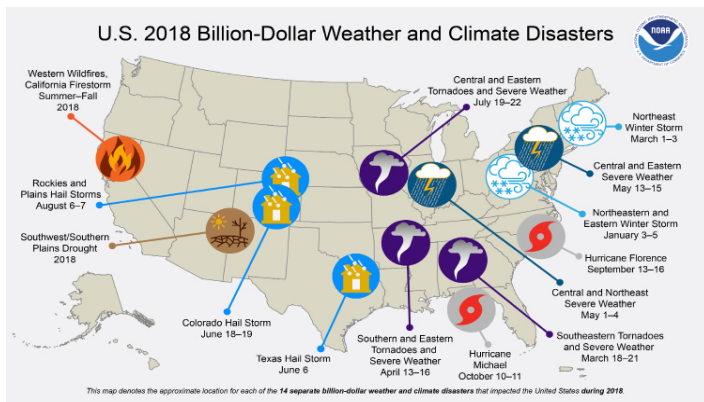


Giving back

GSL-developed technology is used world-wide to educate the public about science.

165 Science on a Sphere® systems have been installed around the world.

- 63 million people visit Science on a Sphere® sites each year.
- 82% of visitors stated that seeing datasets on the sphere changed how they understood information.
- A flat-screen version called SOS Explorer™ makes Science on a Sphere® more accessible, portable, and interactive.



Colorado Springs Hail Storm

Severe hail impacts from baseball to softball size impacted several states including Colorado, Nebraska and Wyoming. The most costly impacts occurred in numerous locations of eastern Colorado.

Softball-sized hail was reported about three miles south of Colorado Springs and hail at the zoo broke out windows and skylights.

Impacts on the public and the economy

- \$172.8 million in damage to vehicles, roofs, siding, windows, skylights and other parts of homes.
- Total is the second highest on record for the Colorado Springs area.
- 21,000 insurance claims on vehicles totaling \$126.3M
- 6,000 claims on homes totaling \$46.6M

GSL's Impact

The experimental version of the High-Resolution Rapid Refresh (HRRR) Ensemble regional analysis and prediction system forecasted the location and path of a severe hailstorm 8 hours in advance of hitting Colorado Springs.



Western wildfires

In 2018, California has experienced its costliest, deadliest and largest wildfires to date, with records back to 1933. The Camp Fire is the costliest and deadliest wildfire - destroying more than 18,500 buildings. California also endured its largest wildfire on record - the Medencino Complex Fire - burning over 450,000 acres. Additionally, California was impacted by other destructive wildfires: the Carr Fire in Northern California and the Woolsey Fire in Southern California. The total 2018 wildfire costs in California (with minor costs in other Western states) approach \$24.0 (\$24.2) billion - a new U.S. record. In total, over 8.7 million acres has burned across the U.S. during 2018, which is well above the 10-year average (2009-2018) of 6.8 million acres. The last 2 years of U.S. wildfire damage has been unprecedented in damage, with losses exceeding \$40.0 (\$40.4) billion.

All five New Mexico compound suspects appear in court. Watch now

CNN U.S. • Crime • Justice • Energy • Environment • Extreme Weather • Space • Science

Smoke from the California wildfires is spreading 3,000 miles to New York City

By Jessica Campbell and Haley Brink, CNN
Updated 8:33 AM ET, Fri August 10, 2018

(CNN) — Take a look at this forecast model from the National Weather Service. It shows how the

More from CNN

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- Supplies sent to Puerto Rico found abandoned

ORVIS

GSL's Impact

HRRR-Smoke is scheduled to be operational in 2020 but NOAA's NWS forecast offices have been sharing HRRR-Smoke images of how smoke will move downstream from the fires to alert communities sensitive to fine airborne particulates. During wildfire operations, NOAA's NWS Incident Meteorologists use HRRR-Smoke in their briefings to stakeholders including the National Park Service and state and local emergency management offices to help with fire management and aviation decisions. Local and national media outlets are sharing HRRR-Smoke forecasts to illustrate how the smoke is impacting the entire U.S.